

CLAIMS

1. A display device for producing a color image using four or more primary colors, comprising:
  - 5 four or more transmissive spatial light modulators to modulate four or more, respective, light beams in accordance with four or more, respective, primary color image components of said color image to produce four or more, respective, modulated light beams.
  - 10 2. The device of claim 1 comprising a beam combining arrangement to combine said four or more modulated light beams into a combined light beam carrying said color image.
  - 15 3. The device of claim 2, wherein said combining arrangement comprises:
    - an X-cube to combine three of said four or more modulated light beams into a three-color light beam; and
    - 15 a dichroic cube to combine a fourth modulated light beam of said four or more modulated light beams with said three-color light beam.
  4. The device of claim 3, wherein said X-cube comprises two dichroic-coated surfaces, and wherein said dichroic cube comprises a dichroic-coated surface.
  5. The device of claim 2, wherein said combining arrangement comprises a prism block including five optical elements, each optical element having at least one dichroic-coated surface.
  - 20 6. The device of claim 2, wherein said combining arrangement comprises:
    - 25 a first dichroic-coated surface to combine first and second modulated light beams of said four or more modulated light beams into a first two-color light beam; and
    - a second dichroic-coated surface to combine third and fourth modulated light beams of said four or more modulated light beams into a second two-color light beam.

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7. The device of claim 6, wherein said combining arrangement comprises a third dichroic-coated surface adapted to combine said first and second two-color light beams.
8. The device of claim 6, wherein said combining arrangement comprises a dichroic-coating X-configuration adapted to combine said first and second two-color light beams.
9. The device of claim 2, wherein said four or more primary colors comprise five or more primary colors, wherein said four or more spatial light modulators comprise five or more spatial light modulators, respectively, and wherein said combining arrangement comprises:
  - 10 a first dichroic-coated surface to combine the modulated light beams of first and second modulators of said five or more modulators into a first two-color light beam;
  - 15 a second dichroic-coated surface to combine the modulated light beams of third and fourth modulators of said five or more modulators into a second two-color light beam; and
  - 15 a dichroic-coating X-configuration adapted to combine said first and second two-color light beams and the modulated light beam of a fifth spatial light modulator of said five or more spatial light modulators.
10. The device of any one of claims 1-9, wherein at least one of said transmissive spatial light modulators comprises a transmissive liquid crystal display panel.
- 20 11. The device of any one of claims 1-10, wherein said four or more light beams comprise four or more, respective, primary color light beams having spectral ranges corresponding to said four or more primary colors, respectively.
- 25 12. The device of claim any one of claims 1-11, comprising a spectrum-splitting arrangement to split light of an illumination source into said four or more primary color light beams.
13. The device of claim 12, wherein said spectrum-splitting arrangement comprises a plurality of dichroic mirrors to separate light of said illumination source into said four or more primary color light beams.

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14. The device of any one of claims 11-13, comprising one or more folding mirrors to direct one or more of said four or more primary color light beams onto one or more of said transmissive spatial light modulators.
15. The device of any one of claims 1-14, wherein said four or more modulated light beams travel substantially the same distance in said combining arrangement.
16. The device of any one of claims 1-15 comprising a projection lens to project said combined light beam onto a screen.
17. The device of any one of claims 1-16 comprising a controller able to separately activate each of said spatial light modulators to produce a four or more transmissive patterns corresponding to four or more primary components, respectively, of a signal representing said color image.
18. The device of claim 16 comprising a converter to convert a three-primary color input signal into the signal representing said color image.
19. A method of producing a color image using four or more primary colors comprising:
- modulating four or more primary color light beams using four, respective, transmissive spatial light modulators in accordance with four or more, respective, primary color image components of said color image to produce four or more, respective, modulated light beams.
20. The method of claim 19, comprising splitting light of an illumination source into said four or more primary color light beams.
21. The method of claim 19 or claim 20 comprising combining said four or more modulated light beams into a combined light beam carrying said color image.
22. The method of claim 21, wherein combining said four or more modulated light beams comprises:
- combining three of said four or more modulated light beams into a three-color light beam; and

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combining a fourth modulated light beam of said four or more modulated light beams and said three-color light beam into said combined light beam.

23. The method of claim 21, wherein said four or more primary colors comprise five or more primary colors, and wherein combining said five or more primary colors 5 comprises:

combining three of said five or more modulated light beams into a three-color light beam; and

combining said three-color light beam and fourth and fifth modulated light beams of said five or more modulated light beams into said combined light beam.